

REMARKS

Claims 1-13 and 15-19 are currently pending in the application. In an Office Action dated March 31, 2002 ("Office Action"), the Examiner rejected claims 1-6 as being unpatentable under 35 U.S.C. 103(a) over Sorenson et al., U.S. Patent No. 6,324,548 ("Sorenson") and rejected claims 7-13 and 15-19 under 35 U.S.C. 103(a) as being unpatentable over Sorenson in view of Sakuraba et al., U.S. Patent No. 5,452,448 ("Sakurabu"). Applicants' representative respectfully traverses the 35 U.S.C. § 103 (a) rejections of claims 1-6, 7-13, and 15-19.

Applicant's representative is quite perplexed on reading the Examiner's rejections - respectfully perplexed, but perplexed nonetheless. Please consider claim 1, provided below for the Examiner's convenience:

1. *A method for backing up a computer-readable object stored on a first logical device unit, the method comprising:*
 - when the object is not currently mirrored to a mass storage device, creating a mirror for the object on a second logical device unit on a mass storage device;*
 - when the object and the mirror for the object are split, resyncing the object with the mirror for the object;*
 - splitting the object and the mirror for the object so that the mirror becomes a backup copy of the object and so that I/O requests directed to the object are not automatically directed to the mirror;*
 - retrieving a current timestamp from the second logical device and saving it as a saved timestamp;
 - updating the timestamp upon executing any I/O operation directed to the second logical device that alters data stored on the second logical device;
 - when the object is determined to need to be restored from the mirror,
 - retrieving a current timestamp from the second logical device;
 - comparing the retrieved current timestamp to the saved timestamp;
 - when the current timestamp is equal to the saved timestamp, copying the mirror to the first logical device to replace or again create the object on the first logical device. (emphasis added)

On page three of the Office Action, the Examiner states that Sorenson teaches the preamble and first three elements of claim 1, including the first, creating-a-mirror element, the second, resyncing-the-object-with-the-mirror element, and the third, splitting-the-object-and-the-mirror element. Claims 2-6 depend from claim 1, and include these elements, and claim 7 includes similar elements, as do claims 8-12 that

depend from claim 7. Neither the language of the preamble nor any of these first three elements are taught, mentioned, or suggested in Sorenson. In fact, there is nothing disclosed in Sorenson that is even remotely related to the preambles and first three elements of claims 1 and 7.

First, please consider the preamble and first element of claim 1: A method for backing up a computer-readable object stored on a first logical device unit, the method comprising: when the object is not currently mirrored to a mass storage device, creating a mirror for the object on a second logical device unit on a mass storage device. The Examiner proposes that Sorenson teaches the preamble and first element of claim 1 in lines 46-53 of column 3, but, in the reference lines of Sorenson, Applicants' representative can find no mention of: (1) logical device units; (2) mirrored objects; or (3) creating a mirror for an object. These concepts are quite thoroughly described in the Background of the Invention section of the current application.

Logical units are described beginning on line 19 of page 3 and mirror and mirroring are quite thoroughly described in several paragraphs beginning on line 15 of page 4. A logical unit includes "a defined amount of electronic data storage space, mapped to the data storage space of one or more disk drives within [a] disk array, and may be associated with various logical parameters including access privileges, backup frequencies, and mirror coordination with one or more LUNs ... Remote computers generally access data within a disk array through one of the many abstract LUNs 208-215 provided by [a] disk array via internal disk drives 203-205 and [a] disk array controller." Mirrors are paired LUNs that mirror each other in the sense that each contains nearly identical data, at any instant in time, with discrepancies due only to differing amounts of time that it might take for each LUN to physically update a disk-storage medium after receiving a I/O write command. Mirroring occurs in real time, with I/O write operations directed to a first LUN of a LUN-mirror pair duplicated by a disk array controller or processor and forwarded to the second LUN of the LUN-mirror pair, as described beginning on line 24 of page 4 with many references to Figure 3 of the current application. The term "logical unit," the synonymous term "logical device unit," and the term "mirror" are not only well defined and described in the current application, but are extremely well-known in the computer field.

The cited portion of Sorenson is completely unrelated to logical units, logical device units, or LUN mirroring. A database and a database-tape backup are not a mirror pair, and neither is a LUN. A database is a software program that, among other things, manages database files. A tape backup is a snapshot of the data state of a database taken while the database is quiescent. I/O commands are not duplicated and executed in real time by a database and a database tape backup. Neither a database nor a tape backup are logical units, and neither is related to the concept of logical units. Nothing in the cited portion of Sorenson has anything to do with the preambles and first elements of claims 1 and 7.

Next, please consider the second element of claim 1: when the object and the mirror for the object are split, resyncing the object with the mirror for the object. Mirror splitting and resynchronization are also thoroughly described in the paragraphs beginning on line 15 of page 4. These terms are also well understood in the computer arts. These terms are not mentioned in lines 63-65 of Sorenson, stated by the Examiner as teaching the second element of claims 1 and 7, and nothing disclosed in Sorenson is even remotely related to mirror splitting and resynchronization. A database and a tape backup are not a mirror pair, and are not related to mirror pairs. A tape backup is not updated synchronously when a database is updated. A database is not a LUN, or even remotely related to a LUN. Mirror splitting and resynchronization are complex operation related to LUN-mirror pairs, and other mass-storage-device logical-unit pairs that are mirrored by processors or mass-storage-device controllers.

The above comments related to the preambles and first two elements of claims 1 and 7 hold equally for the Examiner's proposal that the third element is disclosed by Sorenson in lines 46-52 of Sorenson. Please consider the third element of claim 1: splitting the object and the mirror for the object so that the mirror becomes a backup copy of the object and so that I/O requests directed to the object are not automatically directed to the mirror. The cited portion of Sorenson does not teach, mention, or suggest mirrors or splitting mirrors. I/O requests would not be automatically directed to the object and the object's mirror unless the object and its mirror formed a mirror pair in the first place, and the "splitting" operation clearly recited in the third element identifies a mirror splitting operation to discontinue duplication and automatic

direction of I/O requests to the object's mirror. Sorenson is completely unrelated. Again, a database and tape backups are not mirror pairs, and cannot be split.

The remaining comments by the Examiner are equally perplexing to Applicants' representative. The Examiner equates database dumps and an online database with logical units and seems to indicate that Sorenson mentions disk-array controllers and disk arrays, which Sorenson does not. Applicants' representative must respectfully point out that these rejections simply make no sense, and that stating that many pairs of completely dissimilar and unrelated concepts are equivalent and then rejecting claims based on completely unreasonable equivalences does not constitute a proper rejection.

The Examiner fails to provide reasons for rejecting claim 13, but rejects claims 15-19 for reasons equally perplexing as the reasons stated for rejections of claims 1-12. Consider claim 13, below:

13. A mass storage device that provides logical device units to accessing computers, the mass storage device comprising:
a medium for storing data;
data writing and reading devices for writing data to the medium and reading data from the medium;
memory and logic processing components; and
a controller that executes within a logic processing component and controls reading and writing of data to and from the memory and to and from the medium, the controller providing, in addition to execution of I/O operations, including execution of read and write operations to and from logical device units comprising portions of the medium for storing data, mirroring of an object stored on a first logical device unit to a mirror object stored on a second logical device unit and a current state metric for each logical device unit that can be requested by an accessing computer, the controller updating the current state metric for a logical device unit whenever the controller executes an I/O operation that changes the data, stored on the medium for storing data, included in the logical device unit's data. (emphasis added)

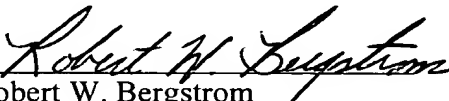
In the above provided claim 13, concepts and terms neither disclosed, mentioned, suggested, nor in any way even tangentially hinted at in the cited portions of Sorenson are underlined. Again, databases and database tape-backup copies are not logical units, logical device units, or a mirror pair of any kind. These terms are well-known in the computer arts.

Applicants' representative has many years of engineering experience, an M.S. in computer science, in addition to other advanced degrees, and would be most

willing to discuss with the Examiner, in a telephone interview, LUNs, disk arrays, mirrored LUNs, mirroring operations, and many of the other concepts and terms recited in the current claims that are not found, nor mentioned or suggested in Sorenson. Applicants' representative would also be most willing to also discuss databases, tape backups, and many of the concepts and terms found in Sorenson, but not in the current application and current claims. Applicants' representative can also supply, on request, computer-science and engineering texts that describe these concepts in detail.

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,
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